

FORM PTO-1390
(REV 10-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

P/1909-154

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

10/019123

INTERNATIONAL APPLICATION NO.
PCT/JP00/03954INTERNATIONAL FILING DATE
16 June 2000PRIORITY DATE CLAIMED
23 June 1999TITLE OF INVENTION **speech/NON-SPEECH FRAME DISCRIMINATOR AND METHOD FOR
DISCRIMINATING BETWEEN SPEECH/NON-SPEECH FRAMES**

APPLICANT(S) FOR DO/EO/US

Masahiro SERIZAWA

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
 2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
 3. ☒ This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
 4. ☒ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
 5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☒ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
 6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
 8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
 9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
 10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).
- Items 11 to 16 below concern document(s) or information included:**
11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
 12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
 13. ☒ A **FIRST** preliminary amendment.
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
 14. ☐ A substitute specification.
 15. ☐ A change of power of attorney and/or address letter.
 16. ☒ Other items or information:


Print EFS Form
Cover sheet of published PCT
Intl. appln.
Intl. Prelim. Exam. Report
Intl. Search Report
4 Drawing Sheets (Figs. 1-8)

EXPRESS MAIL CERTIFICATE

I hereby certify that this correspondence is being
deposited with the United States Postal Service as Express
Mail Post Office to Addresses (mail label
EL918242996US in an envelope addressed to:
Asst. Commissioner for Patents, Washington, D.C. 20231,
on **October 25, 2001**.

Dorothy Jenkins

Name of Person Mailing Correspondence



Signature

October 25, 2001

Date of Signature

Form PTO-1390 (REV. 10-2000) page 2 of 2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Masahiro SERIZAWA

Date: October 25, 2001

Serial No.:

Group Art Unit:

Filed:

Examiner:

For: SPEECH/NON-SPEECH FRAME DISCRIMINATOR AND METHOD FOR DISCRIMINATING BETWEEN SPEECH/NON-SPEECH FRAMES

Asst. Commissioner for Patents
Washington, D.C. 20231

AMENDMENT/SUBMISSION

Prior to examination, please amend the application as follows.

FEE CALCULATION

Any additional fee required has been calculated as follows:

_____ If checked, "Small Entity" status is claimed.

	NO. CLAIMS AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR		EXTRA PRESENT		RATE	ADDIT. FEE
TOTAL	20	MINUS	20	* =	0	X	(\$9 SE or \$18)	\$
INDEP.	4	MINUS	3	** =	1	X	(\$42 SE or \$84)	\$ 84.00
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM						X	(\$140 SE or \$280)	\$

* not less than 20 ** not less than 3

TOTAL \$ 84.00

If any additional payment is required, a check which includes the calculated fee of \$84.00 (OFGS Check No. 6974) is attached.

In the event the actual fee is greater than the payment submitted or is inadvertently not enclosed or if any additional fee during the prosecution of this application is not paid, the Patent Office is authorized to charge the underpayment to Deposit Account No. 15-0700.

10/019123

531 Rec'd PCT.

25 OCT 2001

CONTINGENT EXTENSION REQUEST

If this communication is filed after the shortened statutory time period had elapsed and no separate Petition is enclosed, the Commissioner of Patents and Trademarks is petitioned, under 37 C.F.R. § 1.136(a), to extend the time for filing a response to the outstanding Office Action by the number of months which will avoid abandonment under 37 C.F.R. § 1.135. The fee under 37 C.F.R. § 1.17 should be charged to our Deposit Account No. 15-0700.

AMENDMENTS

☒ If checked, amendment(s) to the specification and/or claims are submitted herewith.

1. ☐ If checked, an abstract is submitted as the last page of Appendix A.

2. Specification:

Please delete the paragraph(s)/section(s) beginning at page, and replace such paragraph(s)/section(s) pursuant to 37 C.F.R. § 1.121(b)(ii) with the "clean" version attached hereto as Appendix A. Entry is respectfully requested. A version with markings to show the changes made pursuant to 37 C.F.R. § 1.121(b)(iii) is attached hereto as Appendix B.

3. Claims:

Please cancel claims _____ without prejudice.

Please amend claims 5, 6, 12 and 13 and add new claims 15-20 pursuant to 37 C.F.R. § 1.121(c)(i) as set forth in the "clean" version attached hereto as Appendix A. Entry is respectfully requested. A version with markings to show the changes made pursuant to 37 C.F.R. § 1.121(c)(ii) is attached hereto as Appendix B.

☐ If checked, the optional complete set of "clean" claims pursuant to 37 C.F.R. § 1.121(c)(3) is attached hereto as Appendix C.

REMARKS/ARGUMENT

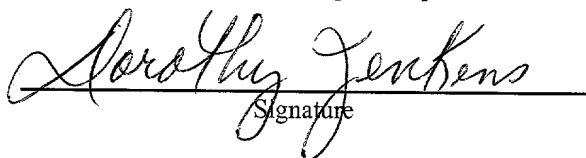
This Preliminary Amendment is being submitted to change the multiple dependent claims to single dependent claims in order to reduce the government filing fee.

EXPRESS MAIL CERTIFICATE

I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail to Addressee (mail label # EL918242996US) in an envelope addressed to: Asst. Commissioner for Patents, Washington, D.C. 20231, on October 25, 2001:

Dorothy Jenkins

Name of Person Mailing Correspondence


Signature

October 25, 2001

Date of Signature

Respectfully submitted,



Steven I. Weisburd

Registration No.:27,409

OSTROLENK, FABER, GERB & SOFFEN, LLP

1180 Avenue of the Americas

New York, New York 10036-8403

Telephone: (212) 382-0700

SIW/jc

1004912 1004912

APPENDIX A
"CLEAN" VERSION OF EACH PARAGRAPH/SECTION/CLAIM
37 C.F.R. § 1.121(b)(ii) AND (c)(i)

CLAIMS (with indication of amended or new):

(Amended) 5. The speech/non-speech frame discriminator claimed in claim 3, characterized in that
said discrimination means is designed for signals limited to a predetermined band.

(Amended) 6. The speech/non-speech frame discriminator claimed in claim 3, further comprising
a band conversion means for converting the band of said input signal and characterized in that
said discrimination means makes said discrimination based on the signal after the band conversion.

(Amended) 12. The speech/non-speech frame discrimination method according to claim 10, characterized in that
making said discrimination is designed for signals limited to a predetermined band.

(Amended) 13. The speech/non-speech frame discrimination method according to claim 10, further comprising a step of
converting the band of said input signal and characterized in that;
said discrimination for each short period is made based on the signal after the band conversion.

(New) 15. The speech/non-speech frame discriminator claimed in claim 4, characterized in that
said discrimination means is designed for signals limited to a predetermined band.

(New) 16. The speech/non-speech frame discriminator claimed in claim 4, further comprising

a band conversion means for converting the band of said input signal and characterized in that

said discrimination means makes said discrimination based on the signal after the band conversion.

(New) 17. The speech/non-speech frame discriminator claimed in claim 16, characterized in that

said discrimination means is designed for signals limited to a predetermined band and unit length.

(New) 18. The speech/non-speech frame discrimination method according to claim 11, characterized in that

making said discrimination is designed for signals limited to a predetermined band.

(New) 19. The speech/non-speech frame discrimination method according to claim 11, further comprising a step of

converting the band of said input signal and characterized in that;

said discrimination for each short period is made based on the signal after the band conversion.

(New) 20. The speech/non-speech frame discrimination method according to claim 19, characterized in that

making said discrimination is designed for signals limited to a predetermined band and unit length.

APPENDIX B
VERSION WITH MARKINGS TO SHOW CHANGES MADE
37 C.F.R. § 1.121(b)(iii) AND (c)(ii)

CLAIMS:

5. The speech/non-speech frame discriminator claimed in claim 3 [or 4], characterized in that

said discrimination means is designed for signals limited to a predetermined band.

6. The speech/non-speech frame discriminator claimed in claim 3 [or 4], further comprising

a band conversion means for converting the band of said input signal and characterized in that

said discrimination means makes said discrimination based on the signal after the band conversion.

12. The speech/non-speech frame discrimination method according to claim 10 [or 11], characterized in that

making said discrimination is designed for signals limited to a predetermined band.

13. The speech/non-speech frame discrimination method according to claim 10 [or 11], further comprising a step of

converting the band of said input signal and characterized in that;

said discrimination for each short period is made based on the signal after the band conversion.

4/PRTS

10/019123

531 Rec'd PCT 25 OCT 2001

SPECIFICATION

SPEECH/NON-SPEECH FRAME DISCRIMINATOR AND METHOD FOR
DISCRIMINATING BETWEEN SPEECH/NON-SPEECH FRAMESTECHNICAL FIELD

The present invention relates to a speech and non-speech frame discriminator and a method for discriminating between speech and non-speech frames. More particularly, it relates to a speech/non-speech frame discrimination system that determines for each predetermined period (predetermined frame) whether an input signal is a speech signal or a non-speech signal.

BACKGROUND ART

This type of conventional speech frame discriminator is used for discriminating between speech periods and non-speech periods in order to reduce the average transmission rate by encoding non-speech periods at a lower rate than speech periods. For example, there is a discriminator used by Annex B to ITU-T Recommendation G. 729. This conventional device uses four types of feature parameters extracted from input signals for each 10-msec frame to determine whether the frame is a speech period (speech frame) or a non-speech period (non-speech frame). For that, the extracted feature parameters are compared with predefined discrimination parameters (thresholds).

The conventional device will be described with reference to Fig. 8. A unit length dividing circuit 20 divides the signal inputted from an input terminal 10 into frames of a length (for example, 10 msec) equivalent to a predetermined period and passes them to a checking circuit 40. The checking circuit 40 checks the input signal passed frame by frame from the unit length dividing circuit 20 to detect and discriminate whether the

10049423 402504

frame is a speech period or a non-speech period, and outputs the result for each frame from an output terminal 60.

The problem with the conventional system shown in Fig. 8 is that when designing a speech/non-speech frame discriminator which can accommodate various input signals with different frequency bands and unit lengths (frame lengths) for discrimination, the discrimination parameters must be set for individual cases to obtain the results appropriate for all cases. This is because the use of a single set of discrimination parameters results in lower discrimination capability.

An object of the present invention is to provide an apparatus and method for determining whether the frame is a speech frame or a non-speech frame using a single algorithm even if an input signal is sampled at several frequency bands and with several period lengths for the discrimination.

DISCLOSURE OF THE INVENTION

The present invention provides a speech/non-speech frame discriminator for determining for each predetermined period (predetermined frame) whether an input signal is a speech signal or a non-speech signal, characterized by comprising band conversion means for converting the band of the above described input signal and discrimination means for making the above described discrimination based on the signal after the band conversion. The discriminator is characterized in that the discrimination means is designed for signals limited to a predetermined band.

Also, the present invention provides a speech/non-speech frame discriminator for determining for each predetermined period (predetermined frame) whether an input signal is a speech signal or a non-speech signal, characterized by comprising dividing means for making a division into shorter periods than the above described predetermined

period, discrimination means for making the above described discrimination for each short period, and unit length conversion means for making discrimination for said predetermined period based on the result for the short periods.

The speech/non-speech frame discriminator is characterized in that the above described unit length conversion means determines said predetermined period to be a speech period when any of said short periods is determined to be a speech period. The speech/non-speech frame discriminator further comprises band conversion means for converting the band of the above described input signal and is characterized in that the above described discrimination means makes the above described discrimination based on the signal after the band conversion. Moreover, the speech/non-speech frame discriminator is characterized in that the above described discrimination means is designed for signals limited to a predetermined band and a predetermined unit length.

Furthermore, the present invention provides a speech/non-speech frame discrimination method for determining for each predetermined period (predetermined frame) whether the input signal is a speech signal or non-speech signal, characterized by comprising a band conversion step of converting the band of the above described input signal and a discrimination step of making the above described discrimination based on the signal after the band conversion.

Also, the present invention provides a speech/non-speech frame discrimination method for determining for each predetermined period (predetermined frame) whether the input signal is a speech signal or a non-speech signal, characterized by comprising a dividing step of making a division into shorter periods than the above described predetermined period, a discrimination step of making the above described discrimination for each short period, and a unit length conversion step of making discrimination for said predetermined period based on the results for the

short periods.

The speech/non-speech frame discrimination method is characterized in that the above described unit length conversion step determines said predetermined period to be a speech period when any of said short periods is determined to be a speech period. The speech/non-speech frame discrimination method further comprises a band conversion step of converting the band of the above described input signal and is characterized in that the above described discrimination step makes the above described discrimination based on the signal after the band conversion.

The operation of the present invention will be described below. The present invention is provided with configuration parameters capable of discriminating between speech and non-speech frames using a predetermined frequency band and a predetermined unit length. In other words, the present invention is provided with a discrimination circuit that has configuration parameters designed for signals limited to a predetermined band and a predetermined unit length. A discrimination is made after a limit is placed on the band to ensure that the input signal has the same frequency band as the predetermined frequency band. This eliminates the need for new configuration parameters to accommodate different bands. However, the input signal must have a band equal to or wider than the predetermined band.

If a frame length is different from a predetermined unit time length, a discrimination is made for the frame based on the results at periods of the predetermined unit length. For example, if any results at periods of the predetermined unit length is "speech," a discrimination result for the frame is of "speech" can be predetermined to the frame. The frame length here must be equal to or longer than the predetermined unit time length.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing an exemplary configuration of a first speech/non-speech frame discriminator according to the present invention;

Fig. 2 is a flowchart showing the operation of the block in Fig. 1;

Fig. 3 is a block diagram showing an exemplary configuration of a second speech/non-speech frame discriminator according to the invention;

Fig. 4 is a flowchart showing the operation of the block in Fig. 3;

Fig. 5 is a diagram showing a frame configuration to illustrate the operation of the block in Fig. 3;

Fig. 6 is a block diagram showing an exemplary configuration of a third speech/non-speech frame discriminator according to the invention;

Fig. 7 is a flowchart showing the operation of the block in Fig. 6; and

Fig. 8 is a block diagram showing an exemplary configuration of a conventional speech/non-speech frame discriminator.

BEST MODE FOR CARRYING OUT THE INVENTION

Embodiments of the present invention will be described with reference to the drawings. Fig. 1 is a block diagram showing an exemplary configuration of a first speech/non-speech frame discriminator according to the present invention, where components equivalent to those in Fig. 8 are denoted by the same reference numerals as those used for the corresponding components in Fig. 8. Fig. 2 is a flowchart showing the operation of the configuration in Fig. 1. A unit length dividing circuit 20 divides the signal inputted from an input terminal 10 into frames of a length (for example, 10 msec) equivalent to a predetermined period (Step S10) and passes them to a band conversion circuit 30.

The band conversion circuit 30 limits the frequency band of the input signal divided into frames of a predetermined length and passed by the unit length dividing circuit 20, to a frequency band that can be checked by

a checking circuit 40 (Step S11) and passes the signal to the checking circuit 40. The checking circuit 40 determines whether speech period or non-speech period (Step S12) for each of the frames passed by the unit length dividing circuit 20 and outputs the result for each frame of the input signal from an output terminal 60.

A circuit with a band-pass filtering or low-pass filtering function, for example, can be employed as the band conversion circuit. There is no doubt that the input signal must have a band equal to or wider than the band after conversion by the band conversion circuit.

Fig. 3 is a block diagram showing an exemplary configuration of a second speech/non-speech frame discriminator according to the present invention, where components equivalent to those in Figs. 1 and 8 are denoted by the same reference numerals as those used for the same components in Figs. 1 and 8. Fig. 4 is a flowchart showing the operation of the configuration in Fig. 3. As shown in Fig. 5(a), a unit length dividing circuit 20 divides the signal inputted from an input terminal 10 into unit lengths (for example, 2.5 msec) shorter than a frame length (for example, 10 msec) (Step S20) and passes them to a checking circuit 40. The checking circuit 40 determines whether a speech period or a non-speech period (Step S21) for each of the short periods passed by the unit length dividing circuit 20 and passes the result for each frame of the input signal to a unit length conversion circuit 50.

The unit length conversion circuit 50 gives a result for each frame (Step S22), based on the multiple results (results of either "speech" or "non-speech" on the short periods in Fig. 5(a)) which correspond to the each frame and which were passed by the checking circuit 40, and outputs it from an output terminal 60. In this case, if any of the short periods composing one frame is predetermined a result for "present" as shown in Fig. 5(a), this frame is predetermined a result for "speech" as shown in Fig. 5(b). There is no doubt that the frame length here must be equal to or

longer than a predetermined unit time length.

Fig. 6 is a block diagram showing an exemplary configuration of a third speech/non-speech frame discriminator according to the present invention, where components equivalent to those in Figs. 1, 3, and 8 are denoted by the same reference numerals as those used for the same or corresponding components in Figs. 1, 3, and 8. Fig. 7 is a flowchart showing the operation of the configuration in Fig. 6. As shown in Fig. 5(a), a unit length dividing circuit 20 divides the signal inputted from an input terminal into unit lengths (for example, 2.5 msec) shorter than a frame length (for example, 10 msec) (Step S30) and passes them to a band conversion circuit 30. The band conversion circuit 30 limits the frequency band of the input signal divided into frames of a predetermined length and passed by the unit length dividing circuit 20, to a frequency band that can be checked by a checking circuit 40 (Step S31) and passes the signal to the checking circuit 40.

The checking circuit 40 determines a speech period or a non-speech period (Step S32) for each of the short periods passed by the band conversion circuit 30 and passes the result for each frame of the input signal to a unit length conversion circuit 50. The unit length conversion circuit 50 gives a result on each frame (Step S33), based on the multiple results (results of either "speech" or "non-speech" on the short periods in Fig. 5(a)) which correspond to the each frame and which were passed by the checking circuit 40, and outputs it from an output terminal 60.

Again, as shown in Fig. 5(a), if any of the short periods composing one frame is predetermined a result for "speech", this frame is predetermined a result for "speech" as shown in Fig. 5(b).

INDUSTRIAL APPLICABILITY

The first advantage of the present invention is that in designing a speech/non-speech frame discriminator that can accommodate various

input signals with different frequency bands, results appropriate for all cases can be obtained. This is because a single discrimination parameter can be used for discrimination.

The second advantage of the present invention is that in designing a speech/non-speech frame discriminator that can accommodate various input signals with different unit lengths (frame lengths) for discrimination, results appropriate for all cases can be obtained. This is because a single discrimination parameter can be used for discrimination.

CLAIMS

1. A speech/non-speech frame discriminator for determining for each predetermined period whether an input signal is a speech signal or a non-speech signal, characterized by comprising band conversion means for converting the band of said input signal and discrimination means for making said discrimination based on the signal after the band conversion.

2. The speech/non-speech frame discriminator claimed in claim 1, characterized in that the discrimination means is designed for signals limited to a predetermined band.

3. A speech/non-speech frame discriminator for determining for each predetermined period whether an input signal is a speech signal or a non-speech signal, characterized by comprising dividing means for making a division into shorter periods than said predetermined period, discrimination means for making said discrimination for each short period, and unit length conversion means for making discrimination for said predetermined period based on the results for the short periods.

4. The speech/non-speech frame discriminator claimed in claim 3, characterized in that

said unit length conversion means determines said predetermined period to be a speech period when any of said short periods is determined to be a speech period.

5. The speech/non-speech frame discriminator claimed in claim 3 or 4, characterized in that

said discrimination means is designed for signals limited to a predetermined band.

6. The speech/non-speech frame discriminator claimed in claim 3 or 4, further comprising

a band conversion means for converting the band of said input signal and characterized in that

said discrimination means makes said discrimination based on the signal after the band conversion.

7. The speech/non-speech frame discriminator claimed in claim 6, characterized in that

said discrimination means is designed for signals limited to a predetermined band and unit length.

8. A speech/non-speech frame discrimination method for determining for each predetermined period whether an input signal is a speech signal or a non-speech signal, characterized by comprising the step of

converting the band of said input signal and,

making said discrimination based on the signal after the band conversion.

9. The speech/non-speech frame discrimination method according to claim 8, characterized in that

making said discrimination is designed for signals limited to a predetermined band.

10. A speech/non-speech frame discrimination method for determining for each predetermined period whether an input signal is a speech signal or a non-speech signal, characterized by comprising the step of

making a division into shorter periods than said predetermined period,

making said discrimination for each short period, and

making discrimination for said predetermined period based on the results for the short periods.

11. The speech/non-speech frame discrimination method according to claim 10, characterized in that

said predetermined period is determined to be a speech period when any of said short periods is determined to be a speech period.

12. The speech/non-speech frame discrimination method according to claim 10 or 11, characterized in that

making said discrimination is designed for signals limited to a predetermined band.

13. The speech/non-speech frame discrimination method according to claim 10 or 11, further comprising a step of

converting the band of said input signal and characterized in that;

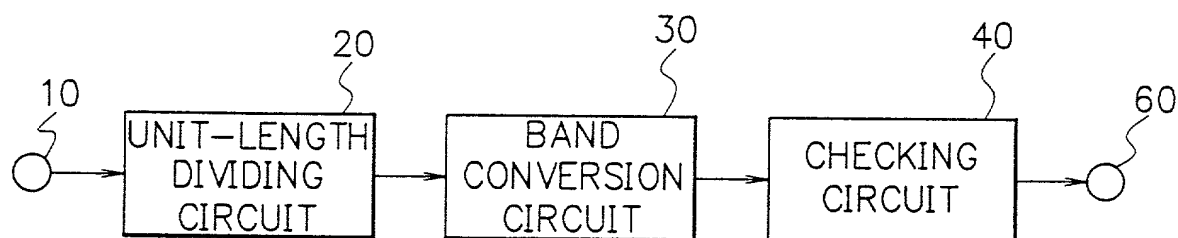
said discrimination for each short period is made based on the signal after the band conversion.

14. The speech/non-speech frame discrimination method according to claim 13, characterized in that

making said discrimination is designed for signals limited to a predetermined band and unit length.

1/4

F I G. 1



F I G. 2

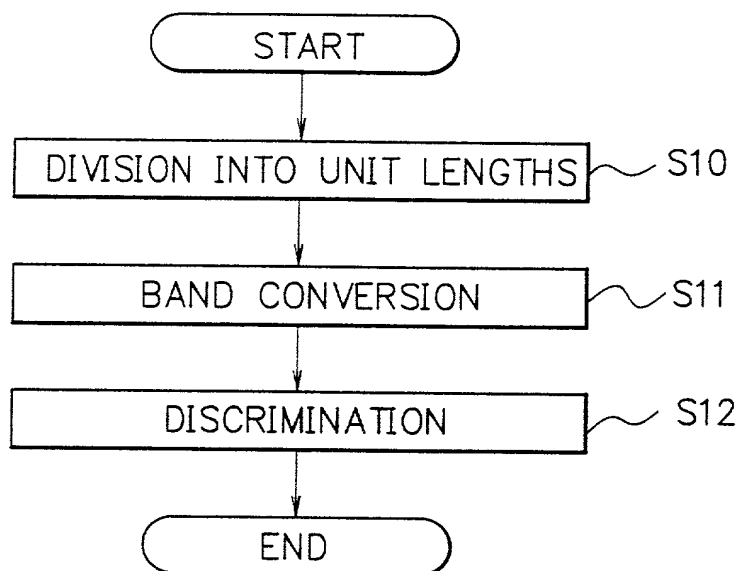


FIG. 3

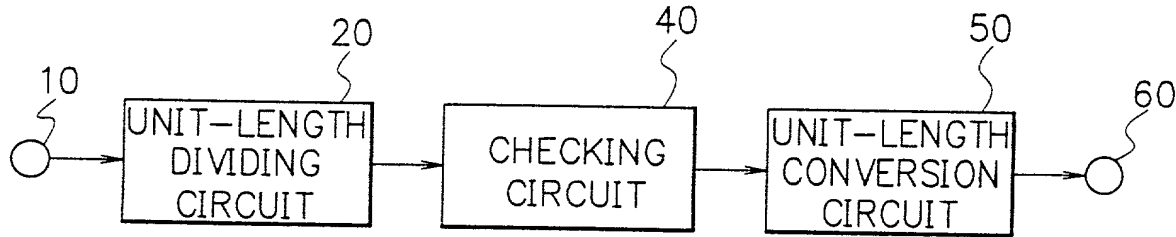
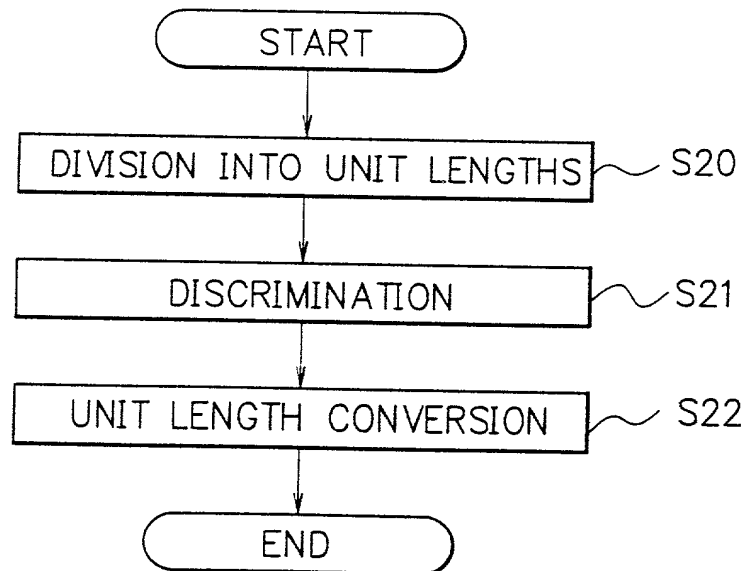


FIG. 4



3/4

FIG. 5

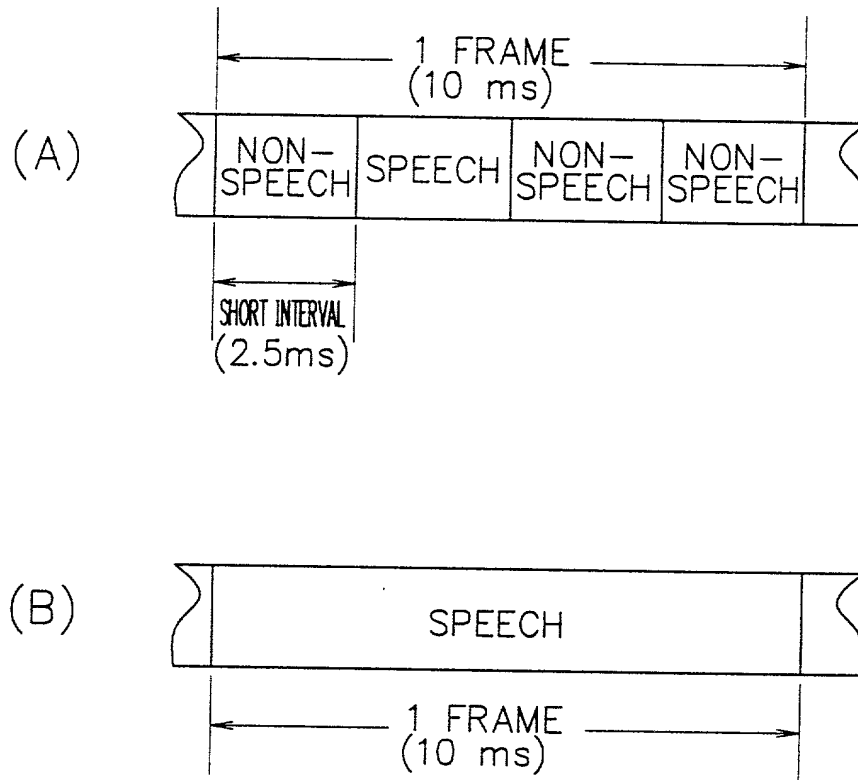
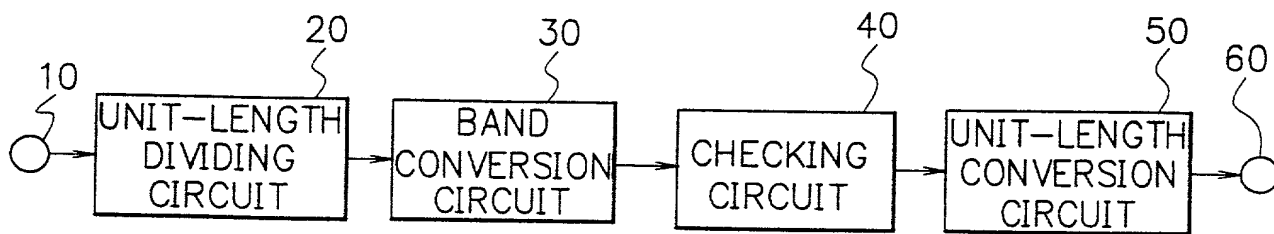
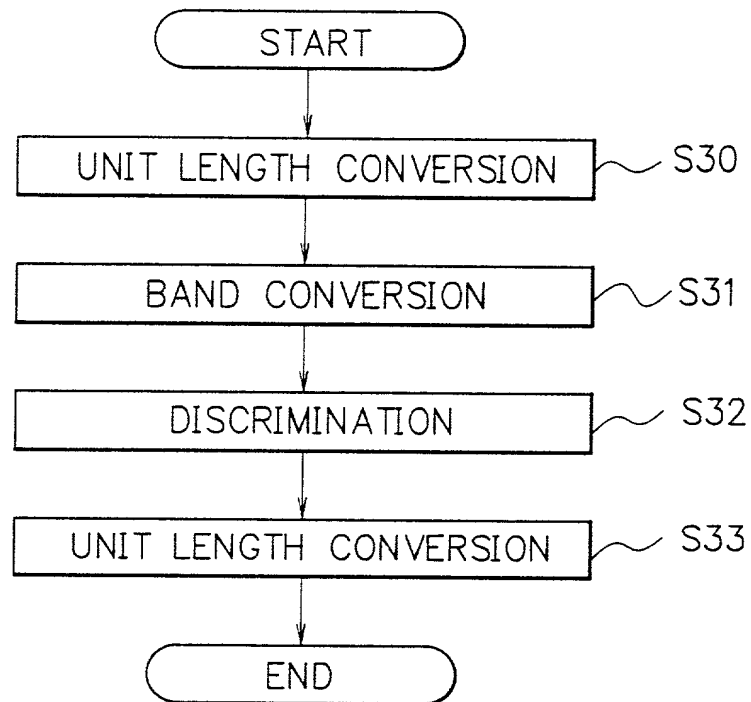


FIG. 6

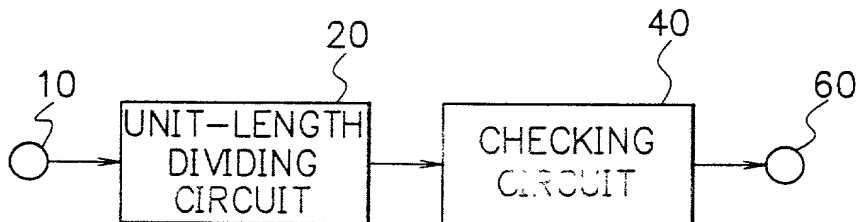


4/4

F I G. 7



F I G. 8



UNITED STATES OF AMERICA COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION	OFFGS FILE NO. <u>P/1909-154</u>
---	--

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that I verily believe that I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SPEECH/NON-SPEECH FRAME DISCRIMINATOR AND METHOD FOR DISCRIMINATING BETWEEN
SPEECH/NON-SPEECH FRAMES

the specification of which is attached hereto, unless the following box is checked:

☒ was filed on June 16, 2000 as United States patent Application Number or PCT International patent application number PCT/JP00/03954 and was amended on _____ (if any).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known to be material to patentability in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim priority benefits under Title 35, United States Code §119 of any foreign application(s) for patent or inventor's certificate or United States provisional application(s) listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign or Provisional Application(s)

COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. 119
Japan	176167/1999	23, 6, 1999	YES <u>X</u> NO _____
			YES _____ NO _____
			YES _____ NO _____

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

UNITED STATES APPLICATION NUMBER	DATE OF FILING (day, month, year)	STATUS (patented, pending, abandoned)

I hereby appoint OSTROLENK, FABER, GERB & SOFFEN, and the members of the firm, Marvin C. Soffen - Reg. No. 17,542; Samuel H. Weiner - Reg. No. 18,510; Jerome M. Berliner - Reg. No. 18,653; Robert C. Faber - Reg. No. 24,322; Edward A. Meilman - Reg. No. 24,735; Stanley H. Lieberstein - Reg. No. 22,400; Steven I. Weisburd - Reg. No. 27,409; Max Moskowitz - Reg. No. 30,576; Stephen A. Soffen - Reg. No. 31,063; James A. Finder - Reg. No. 30,173; William O. Gray, III - Reg. No. 30,944 and Louis C. Dujmich - Reg. No. 30,625, as attorneys with full power of substitution and revocation to prosecute this application, to transact all business in the Patent & Trademark Office connected therewith and to receive all correspondence.

SEND CORRESPONDENCE TO: OSTROLENK, FABER, GERB & SOFFEN
1180 AVENUE OF THE AMERICAS
NEW YORK, NEW YORK 10036-8403

DIRECT TELEPHONE CALLS TO:
(212) 382-0700

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF SOLE OR FIRST INVENTOR <u>MASAHIRO SERIZAWA</u>	INVENTOR'S SIGNATURE <u>Masahiro Serizawa</u>	DATE <u>7/31/2001</u>
RESIDENCE <u>Tokyo, Japan</u>		COUNTRY OF CITIZENSHIP <u>Japan</u> <u>JPX</u>
POST OFFICE ADDRESS <u>c/o NEC Corporation, 7-1, Shiba 5-chome, Minato-ku, Tokyo, Japan</u>		
FULL NAME OF SECOND JOINT INVENTOR (IF ANY)	INVENTOR'S SIGNATURE	DATE
RESIDENCE		COUNTRY OF CITIZENSHIP
POST OFFICE ADDRESS		
FULL NAME OF THIRD JOINT INVENTOR (IF ANY)	INVENTOR'S SIGNATURE	DATE
RESIDENCE		COUNTRY OF CITIZENSHIP
POST OFFICE ADDRESS		